

Investigating the Impact of Pesticides on Potato Farmers in Ecuador



Potato farmers in the province of Carchi apply pesticides around seven times during the growing season. (Photo courtesy of D. Cole)

2001-04-27

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Potato farmers in the province of Carchi in northern Ecuador suffer from decreased mental capacity caused by high exposure to chemical insecticides. This is lowering their productivity by impairing their ability to make good farming decisions.

Some 8,000 commercial growers in this region account for about 40% of Ecuador's potato production. These farmers are among the country's heaviest pesticide consumers. They apply pesticides, using backpacks because of the hilly terrain, an average of seven times during the crop growth period — using up to 43 active ingredients, some of which are restricted in Canada and the United States.

Risk factors

"They wear no special protective clothes, they mix pesticides with their hands or a stick, their backpack sprayers often leak — so their exposure is very high," says [Donald Cole](#), a physician and scientist from McMaster University's Institute of Environment and Health in Hamilton, Ontario. Storing pesticides in the farmhouse, inadequate waste facilities, and unsafe disposal are also factors that contribute to the health problems of farmers and their families.

Dr Cole has been working with farm families in Carchi for the past decade. He and [Charles Crissman](#) of the [International Potato Center \(CIP\)](#) in Ecuador were part of a 1990-1993 study, called '[Tradeoffs](#),' which explored the health, environmental, and productivity impacts of pesticide use. They are the principal investigators in the Ecosalud project, which aims to reduce pesticide use and related health problems among the potato farmers, as well as conduct a policy analysis and present it to local and national decision makers. Jointly funded by the International Development Research Centre (IDRC), US AID, and other donors, the project involves scientists from many research institutions.

Ecosalud goals

"Ecosalud is primarily an interventions and evaluation project to strengthen the capacity of local farm communities to handle pesticides safely and to modify production," says Dr Cole. The work began in 1998, and the project is funded until April 2002.

Dr Cole, whose background is in occupational and community health, says Ecosalud is unique in that it integrates many different projects and disciplines. It is one of several IDRC-funded projects that aim to improve the management of agroecosystems to achieve better human health. Dr Crissman, an agricultural economist with 15 years experience in developing countries, adds that the project offered him a rare opportunity to work with an epidemiologist in an agricultural setting.

Training farmers

The research team is working with groups of 15-20 families from each of three Carchi communities. Their efforts focus on improving health and agricultural productivity by training farmers in methods of integrated crop management, and safe pesticide handling.

"We are teaching the principles of integrated crop management at farmer field schools," explains Dr Cole. "Researchers and technical experts go through the complete cycle of cultivation, using conventional methods on one plot and experimenting on the other. Participating farmers monitor a variety of soil, water, pest, disease, and crop variables, and then share what they've learned with others in their communities."

Exposure pathways

In addition, farm families are being shown how to handle pesticides in ways that decrease their exposure. To educate farmers about exposure pathways, the researchers are using fluorescent tracers that illustrate how pesticides can stay on hands or clothes and quickly contaminate entire households.

Initial findings from this project and from the earlier Tradeoffs study indicate that:

- the higher the pesticide use, the more neurobehavioural problems among both farmers and their families, and the lower their capacity to make efficient farming decisions;
- farmers are reducing pesticide use: on the experimental plots, participants have installed pest traps that reduce the number of pesticide applications;
- integrated crop management knowledge among farmers and their families is improving; and
- the yield loss associated with reducing pesticides is more than compensated by improved crop yields due to better decision making.

Analysis model

Over the coming months, Ecosalud will continue its education work. As well, a new analysis model is being created that will show how human health impacts agricultural production. This model builds on earlier work in the Tradeoffs project, by including information on household practices, poverty levels, and dietary habits to show how farmers' decisions and methods affect production, income, the environment, and human health.

According to Dr Cole, this kind of model is a unique aspect of the project: while many integrated crop management projects promote more sustainable agriculture through farmer field schools, not many have set up an epidemiologically sound, systematic way to document health impacts and incorporate them into farm production models.

Research implications

Aside from its immediate impacts on the three participating communities, the Ecosalud research has broader applications. "We hope to provide an example which can be generalized within the Andean region among potato producers: ways to increase production while decreasing risks to health," explains Dr Cole.

And in the long term, Ecosalud represents a move toward the widespread inclusion of health considerations in agroecosystem management. "We want to see a health component in the evaluation of farmer field school interventions and integrated crop management on a much more general scale. That's our goal: that human health can be incorporated as one of the benefits of changing agricultural activity," he concludes.

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Selected References:

Antle JM, Cole DC, Crissman CC. 1998. "Further Evidence on Pesticides, Productivity, and Farmer Health: Potato Production in Ecuador." *Agricultural Economics: An International Journal*. 2(18): 199-208.

Cole DC, Carpio F, Julian J, Leon N, Carbotte R, De Almeida H. 1998. "Neurobehavioural outcomes among farm and non-farm rural Ecuadorians." *Neurotoxicology & Teratology*. 19: 277-286.

Cole DC, Carpio F, Julian J, Leon N. 1997. "Dermatitis in Ecuadorean farm workers." *Contact Dermatitis*. 137: 1-8.

Cole DC, Carpio F, Julian J, Leon N. 1998. "Assessment of peripheral nerve function in an Ecuadorean rural population exposed to pesticides." *Journal of Toxicology and Environmental Health*. 55: 101-115.

Cole DC, Carpio F, Leon N. 2000. "Economic burden of illness from pesticide poisonings in highland Ecuador." *Pan American Journal of Public Health*. 8: 196-201.

Crissman CC, Cole DC, Carpio F. 1994. "Pesticide Use and Farm Worker Health in Ecuadorian Potato Production" *American Journal of Agricultural Economics*. 76 (3): 593-597.